



Self-Injury among Early Adolescents

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ABSTRACT

Background: Whereas much attention has been focused on adolescent risk behaviors such as substance use, much less has been devoted to self-injury in the general adolescent population. **Purpose:** This study had two purposes: (1) describe the prevalence of self-injury among early adolescents in the general middle school population, and (2) identify behaviors that are comorbid with self-injury. **Methods:** This study involved a secondary analysis of data gathered from 1,734 6th and 8th grade students using the middle school Youth Risk Behavior Survey. **Results:** The prevalence of self-injury among middle school youth in this study ($N=1734$) was 28.4%. Although the relationship between having ever tried self-injury and gender was significant, the effect size was small. Multilevel logistic regression identified six variables that were significantly related to ($P < 0.01$) having ever tried self-injury: peer self-injury, having ever tried inhalants, grade level, and belief in possibilities, abnormal eating behaviors and suicide. **Discussion:** This is the first study to empirically examine self-injury in relation to multiple risk behaviors within a community sample of early adolescents with the goal of informing school-based prevention efforts. **Translation to Health Education Practice:** School personnel can be observant for evidence of self-injury as well as other risk behaviors and be vigilant about experiences that may be contributing to their development.

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BACKGROUND

Identified as the “fastest-growing adolescent behavioral problem,” self-injury has risen among adolescents.¹ It is unknown whether increases in self-injury represent true increases or increased reporting due to media attention.^{1,2} Whereas much attention has been focused on other adolescent risk behaviors such as substance use, much less has been devoted to self-injury in the general adolescent population.¹ Few studies have focused on self-injury within general populations.^{1,3} To develop effective preventive interventions, the scope of self-injury among adolescents in community settings and factors related to the behavior, especially those amenable to change and useful in identifying vulnerable youth, need to be determined.

This study focuses on superficial/moderate self-injury, which Muehlenkamp defined as “low-lethality actions that alter or damage body tissue (e.g., cutting, burning) without suicidal intent”^{4(p.325)}. Most definitions emphasize that self-injury is deliberate, distinct from suicide and is not culturally sanctioned. Self-injury can be classified into two broad categories—direct or indirect.⁵⁻⁷ Direct self-injury, which includes cutting, biting, severing, burning and hitting, is of primary interest in this study. Examples of indirect self-injury include overeating and substance abuse.⁷

Existing evidence suggests self-injury has increased dramatically due, in part, to the dynamic of social contagion.⁸⁻¹⁰ Although the secret or private nature of self-injury has been emphasized, evidence of social con-

tion indicates self-injury during adolescence may not be as private as the literature would suggest.¹¹ Further, the infiltration of self-injury into popular culture over the past two decades suggests the social unacceptability of self-injury may be giving way to some level of tolerance.¹¹

Most acts of self-injury are precipitated by a sense of loss, interpersonal conflict or

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perceived rejection, or isolation.¹²⁻¹⁵ Relationship and communication difficulties between parent and youth may place some youth at risk for self-injury.¹⁶ Interestingly, in a community sample of adolescents, getting “a reaction” from another person was one of the most common reasons cited for deliberate self-harm.¹⁷ Further, adolescents move away from parents and toward their peers as a part of the individuation process, thereby setting the scene for some youth to experiment with self-injury when exposed within their peer networks.¹⁶ In addition, youth exposure to media increases substantially during the teenage years, which may lead some youth to attempt the behavior on impulse when exposed to self-injuring models on the Internet or in the media.¹⁸⁻¹⁹

Traditionally, self-injury has been reported to be a white, female, middle-to-upper middle class issue.²⁰⁻²² However, this description may represent a sampling artifact: white, female inpatients have been over-represented in clinical studies.⁶ On the other hand, racial/ethnic variations in vulnerability to suicide, depression and eating disorders suggest ethnic groups, particularly low-income, Hispanic females, may be at increased risk for self-injury.²⁰ However, studies have been limited by insufficient numbers of participants within ethnic groups to study variation.²³

As with gender differences in other expressions of emotional distress (e.g., depression), there may be gender differences in self-injurious behaviors and underlying motivations.⁵ There is a lack of information on self-injury among males due to their under-representation in clinical settings.^{5,24} Ross and Heath²² reported a greater proportion of females who self-injured, whereas Muehlenkamp and Gutierrez⁴ found no statistically significant gender differences in self-injury rates among high school students in a community setting.

Whereas comorbidity between self-injury and psychological disorders has been established (e.g., eating disorders), there is reason to believe self-injury may be related to other risk behaviors.^{14,25,26} For example, given the relationship between low

serotonin levels and cigarette smoking, one would expect to see a relationship between self-injury and cigarette smoking.²⁷ Also, alcohol use may increase disinhibition and risk taking, setting the stage for self-injury.²⁸ It is important to note, however, that within clinical samples, at least, alcohol or other substance use is not a necessary condition for self-injury to occur.²⁹ Although suicide and self-injury are distinct phenomena, a substantial proportion of those who self-harm commit suicide; thus, a relationship among suicidal ideation, planning, and suicide attempts and self-injury would be expected.³⁰ Antisocial behaviors (e.g., violence) also have been associated with self-injury.³¹ Self-injury is a risk behavior prevalent among youth and thus, relationships with other risk behaviors including alcohol, substance use, suicide, shoplifting and skipping school would be expected.³² However, one study failed to support relationships between self-injury and other impulsive behaviors including alcohol abuse, stealing, and suicide attempts.²⁶ Psychological distress has been associated with health risk behaviors such as unprotected sex, sex with multiple partners, dating violence, smoking, weapon carrying, attempted suicide and poor health.³³ Assuming self-injury is a symptom of psychological distress, it should be associated with other health risk behaviors that have demonstrated relationships with psychological distress.

PURPOSE

The current study extends the literature through exploring gender differences in self-injury and empirically examining self-injury in relation to multiple risk behaviors within a community sample of early adolescents. Overall, this study had two purposes: (1) describe the prevalence of self-injury among early adolescents in the general middle school population, and (2) identify behaviors that are comorbid with self-injury. Early adolescents were selected because many risk behaviors emerge during this period of time. Additionally, the local school board for the district where this study was conducted reported a problem with the behavior of

self-injury in their middle schools. Recommendations to examine racial and gender variations in the prevalence, frequency and correlates of self-injury were followed.²⁴ The relation between the environment (e.g., self-reported exposure to peers who self-injure, media exposure, exposure to violence) and individual behavior (i.e., having ever tried self-injury) was considered.³⁴ For the purposes of this study, self-injury was defined as the performance of a harmful behavior such as cutting, scratching, burning, not allowing wounds to heal, or pinching, by a person who feels upset as a way to feel better (less upset). A distinction was not made between episodic and repetitive self-injury given the lack of available measures of psychological symptoms (i.e., indicators of diagnosable mental illness) and impulsivity.

METHODS

Participants

The accessible population for this study included sixth- and eighth-grade students in eight middle schools in a large, southwestern county in Florida. The school district has a policy of only sampling 6th and 8th graders (i.e., obtaining data from both ends of the spectrum) to minimize research costs. Special education students were not included as they were not included in the survey administration as per the study county's district policy. Approximately 2,350 surveys were distributed across schools in 2005. Surveys were administered to half of all 6th and 8th grade classrooms. The other half of the classrooms participated in an alternative survey (i.e., Communities that Care). A total of 2,003 valid surveys were completed, resulting in an initial response rate of 85.23%. Only students who: (1) self-reported attending one of the eight middle schools, (2) reported being in sixth or eighth grade, (3) responded to the having ever tried self-injury item, and (4) did not report responding untruthfully were retained, resulting in a total study sample of 1,748 students (74% of the total surveys distributed). Truthfulness was determined using the following self-report item—*In general, how often did you tell the truth in*



answering the questions on this survey—that was included on the modified version of the YRBS. Table 1 provides a summary of student demographics by school. Overall, sampling resulted in an obtained sample of 31% of enrolled sixth graders and 32% of enrolled eighth graders. Random sampling was not used.

Unlike clinical samples where the diagnosis and receipt of services are known, individuals included in the accessible population may or may not have had a clinical diagnosis associated in the clinical literature with self-injury (i.e., depression). Further, some students may have been receiving psychological services at the time of survey administration either from a private clinician or from a school psychologist. According to the school board of the study county, approximately 2% to 3% of middle schools students received psychological services in the schools during the 2005-2006 school year. The proportion of students receiving psychological services from private clinicians was unknown. The study protocol was reviewed and approved by the University of South Florida Institu-

tional Review Board, Social and Behavioral Sciences Division.

Instrumentation

This study involved a secondary analysis of data gathered using a modified version of the middle school Youth Risk Behavior Survey (YRBS).³⁵ The YRBS is a school-based classroom survey of risk behaviors self-reported by middle school youth. Three items measured aspects of self-injury: (1) lifetime prevalence—Have you ever hurt yourself on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?; (2) past 30-day prevalence—During the past month, how often have you hurt yourself on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)?; and (3) awareness of peer self-injury behavior—Have any of your friends hurt themselves on purpose (cutting, scratching, burning, not allowing wounds to heal, pinching)? A dichotomous response scale for lifetime prevalence and awareness of peer self-injury behavior was used (no = 0, yes = 1); past 30-day prevalence was measured on the following scale: never (1), one time (2), 2 or 3 different times (3),

4 or 5 different times (4), and 6 or more different times (5). Cognitive interviewing with a sample of middle school youth was used to gather validity evidence for the newly developed self-injury items. Results suggested that the children understood the items and that the items, which were grounded in the literature, measured what they were designed to measure. In addition to demographic items (e.g., grade, gender, and race), indicators of problem behavior theory, social contagion, precipitants of self-injury and developmental theory were identified in the 2005 YRBS (see Tables 2 and 3 for a list of variables and descriptive statistics). Cronbach's alpha was calculated for item sets that were designed to measure the same behavior or underlying construct. Alphas ranged from .51 for Deviant Behavior, a two-item scale to .88 for the ten-item Substance Use scale.

The lack of standardized measures of self-injury served as a limitation in terms of item development and selection. In addition, the need to limit the number of items included on the YRBS precluded the inclusion of multiple items designed to measure

Table 1. Description of the Accessible Population by School (N=1743, December 2005)

	SCHOOL								χ^2
	1	2	3	4	5	6	7	8	
Total # of Students	222	176	431	122	254	170	158	210	
Gender									5.31,
% Female	51	52	51	51	56	58	48	50	$P = 0.62$, df=7
Race/Ethnicity									
% White	34	74	76	81	78	84	81	84	310.89,
% Black or African American	28	10	8	6	7	3	2	1	$P < 0.0001$,
% Hispanic or Latino	33.5	10	9.5	5	10	6	8	9	df = 35
% Other Race or Ethnicity	4	6	7	8	6	7	9	7	
Grade*									69.04,
% 6th grade	48	24	42	39	58	53	44	57	$P < 0.0001$, df = 7
% Free/Reduced Price Lunch	66.0	35.7	39.8	23.0	33.5	4.1	15.7	27.4	211.34, $P < 0.001$, df = 7

Note: Five students included in the sample did not report school attended.

*The sample was limited to students in 6th and 8th grades.

**Table 2. Scale Definitions and Internal Consistency Reliability**

Abnormal Eating^a (Cronbach's α = .59) 1. Have you ever gone without eating for 24 hours or more (also called fasting) to lose weight or to keep from gaining weight? 2. Have you ever taken any diet pills, powders, or liquids without a doctor's advise [sic] to lose weight or to keep from gaining weights? (Do not include meal replacement products such as Slim Fast.) 3. Have you ever vomited or taken laxatives to lose weight or to keep from gaining weight.
Attitude Toward School^b (Cronbach's α = .55) 1. People at my school notice when I am good at something. 2. I participate in activities (clubs, sports, WEB, etc.) at this school. 3. There is at least one teacher or adult at this school I can talk with if I have a problem.
Belief in Possibilities^b (Cronbach's α = .76) 1. I believe I can choose to not smoke cigarettes or drink alcohol, even if I'm going through tough times. 2. I believe my future holds many possibilities. 3. I believe I have better things to do than smoke cigarettes or drink alcohol.
Bully – Victim^c (Cronbach's α = .74) 1. During the past 30 days, how many times did another student tease or call you names? 2. During the past 30 days, how many times did another student threaten to hit or hurt you? 3. During the past 30 days, how many times did another student spread rumors about you? 4. During the past 30 days, how many times did other students not let you join in what they were doing? 5. During the past 30 days, how many times did another student push, shove, slap, hit, or kick you on purpose?
Substance Use^d (Cronbach's α = .88) 1. Have you ever tried cigarette smoking, even one or two puffs? 2. During the past 30 days, have you smoked cigarettes, even one or two puffs? 3. During the past 30 days, on how many days did you smoke cigarettes? 4. Have you ever had a drink of alcohol, other than a few sips? 5. In the past 30 days, have you had any alcohol to drink, other than a few sips? 6. In the last year, have you had five or more drinks of alcohol in one day? 7. During the past 30 days, how many times have you had 5 or more drinks in one day? 8. Have you ever used marijuana? 9. During the past 30 days, how often have you used marijuana? 10. Have you ever used prescription drugs or over the counter medicine (cough/cold medicine) to get high?
Parent Communication^e (Cronbach's α = .83) 1. My parents have talked to me about their feelings toward me smoking cigarettes. 2. My parents have talked to me about their feelings toward me drinking alcohol.
Deviant Behaviors^f (Cronbach's α = .51) 1. Since school started this year how many times have you skipped school? 2. During the past 12 months, how often have you shoplifted (stolen something from a store)?
Suicide^a (Cronbach's α = .75) 1. Have you ever seriously thought about killing yourself? 2. Have you ever made a plan about how you would kill yourself? 3. Have you ever tried to kill yourself?
^a Response scale for items goes from 0 (No) to 1 (Yes). ^b Response scale for items goes from 1 (Strongly Disagree) to 5 (Strongly Agree). ^c Response scale for items goes from 0 (0 times) to 4 (10 or more times). ^d Response scale for items 1 – 2, 4 – 6, 8, and 10 goes from 0 (No) to 1 (Yes). Response scale for items 3, 7, and 9 goes from 0 days to 30 days. ^e Response scale for items goes from 0 (No) to 2 (Yes). ^f Response scale for item 1 goes from 0 (Never) to 4 (More than 3 times). Response scale for item 2 goes from 0 (0 times) to 4 (6 or more times).

Table 3. Scale Descriptive Statistics

Scale	N	Range	Mean	Median	SD	Skewness	Kurtosis
Abnormal Eating (Original)	1646	0-3	0.26	0.00	0.62	2.60	6.65
Abnormal Eating (Transformed) ^a	1646	-0.69-1.25	-0.45	-0.69	0.52	1.88	2.05
Attitudes Toward School	1535	1-5	3.74	4.00	0.94	-0.69	0.12
Belief in Possibilities (Original)	1538	1-5	4.53	4.67	0.70	-2.13	5.39
Belief in Possibilities (Transformed) ^b	1538	-0.99-0.54	-0.06	0.28	0.43	-0.91	-0.56
Bully – Victim	1746	0-4	0.73	0.40	0.78	1.51	2.17
Substance Use (Original) ^c	1708	-0.43–3.86	0.00	-0.39	0.69	2.70	8.31
Substance Use (Transformed) ^a	1708	-2.63–1.47	-1.32	-2.21	1.05	0.76	-0.68
Parent Communication	1542	0-2	1.40	2.00	0.81	-0.85	-0.96
Deviant Behavior (Original) ^c	1595	-0.44–3.74	-0.00	-0.44	0.82	2.46	6.58
Deviant Behavior (Transformed) ^a	1595	-2.81–0.44	-1.81	-2.81	1.41	0.87	-0.93
Suicide	1732	0–3	0.43	0.00	0.85	1.96	2.75

Note: All variables were coded so that a higher score represented a higher amount of the characteristic, behavior, or attitude being measured.

^aThis scale was transformed to normalize the distribution using the natural log function in SAS. Statistical testing was conducted using the original and transformed scales.

^bThe belief scale was transformed to normalize the distribution using the cos(ine) function in SAS. Statistical testing was conducted using the original and transformed scales.

^cVariables were standardized (Mean = 0, SD = 1), and a composite variable was created by taking the average of the standardized variables.

all key aspects of self-injury (e.g., preferred methods). For example, items used in this study were not specific enough to enable the determination of types of self-injury. On the other hand, the desire for information was weighed against the desire to do no harm. The inclusion of multiple items seeking more in-depth information about the behavior may have triggered the behavior among vulnerable youth.

Although the use of self-report data was a limitation, several precautions were taken to ensure the validity of students self-reports. Students were assured of the anonymity of the survey administration, identifying information was not collected, and a truthfulness item was included on the YRBS.

Analysis Plan

Statistical testing involved univariate, bivariate and multivariate analyses and was conducted using the original and transformed scales; results were compared to examine the sensitivity of the results to non-normality. Effect sizes, including Cramer's V for relationships involving categorical variables and Cohen's d for mean comparisons, were used to evaluate the magnitude of the

relationships (see Table 4 for interpretive guidelines). Multilevel logistic regression was used because students (Level-1) were nested within schools (Level-2). Only Level-1 predictors were used. The outcome variable predicted was having ever self-injured (dichotomous). Multilevel analyses were conducted using HLM 6.0.³⁶ The final model reports original variables.

RESULTS

Description of self-injury

The prevalence of self-injury among middle school youth in this study (N = 1734) was 28.4%, with a margin of error of $\pm 2.1\%$ at 95% confidence. There was a statistically significant and large relationship between having ever tried self-injury and past month frequency of self-injury, $\chi^2(4, N = 1746) = 755.74, P < 0.0001$, Cramer's V = 0.66. Among youth who self-reported having ever tried self-injury (N=495), 35% had harmed themselves one time during the past month, 18% had harmed themselves two or three different times, 5.5% had harmed themselves four or five different times, and 11% had harmed themselves six or more dif-

ferent times. Almost half (46.8%, 95% CI = 45.6% - 48.0%) of youth surveyed reported knowing of a friend who had harmed themselves on purpose to feel better. There was a significant, yet small relationship between knowing a friend who had tried self-injury and having ever tried self-injury. Whereas 39% of those who had not tried self-injury reported knowing of a friend who had tried self-injury, 66% of those who had tried self-injury reported knowing of a friend who had tried self-injury, $\chi^2(1, N = 1732) = 105.01, P < 0.0001$, Cramer's V = 0.25.

Bivariate relationships involving self-injury and demographics

Although the relationship between having ever tried self-injury and gender was significant ($P < 0.01$), the effect size was negligible (Cramer's V = 0.07). Approximately 32% of females and 25% of males had ever tried self-injury, $\chi^2(1, N = 1740) = 9.75, P < 0.01$, Cramer's V = 0.07. There were no significant or meaningful associations between having ever tried self-injury and race or ethnicity, $\chi^2(5, N = 1726) = 7.08, P = 0.21$, Cramer's V = 0.06, grade level, $\chi^2(1, N = 1748) = .10, P = 0.75$, Cramer's V = 0.01, age,

**Table 4. Cohen's Effect Size Interpretation Rules-of-thumb**

	Cohen's d	Correlation Coefficient	Odds Ratio	Cramer's V
Small	.20	.10	1.50	df = 1; $10 < V < .30$ df = 2; $07 < V < .21$ df = 3; $06 < V < .17$
Medium	.50	.25	2.50	df = 1; $30 < V < .50$ df = 2; $21 < V < .35$ df = 3; $17 < V < .29$
Large	.80	.40	4.30	df = 1; $V > .50$ df = 2; $V > .35$ df = 3; $V > .29$

Note: The guideline for chi-square tests of independence with 3 degrees of freedom was used for tests with greater than three degrees of freedom.

$t(1744) = -.01, P = 0.99$, or school attended, $\chi^2(7, N = 1743) = 12.53, P = 0.08$, Cramer's $V = 0.08$. For a description of additional bivariate relationships see Table 5.

Multilevel logistic regression analyses

Hierarchical generalized linear modeling was used to examine the relation between 21 potential risk factors and the outcome of having ever tried self-injury (no, yes).³⁷ A logit link function was used and parameter estimates were obtained using penalized quasi-likelihood estimation (PQL) obtained in HLM 6.0. Results indicated that six level-1 variables were significantly related to ($P = 0.01$) having ever tried self-injury while controlling for all other variables in the model: peer self-injury, having ever tried inhalants, grade level, belief in possibilities, abnormal eating behaviors and suicide (Table 6). With the exception of suicide (medium effect), all relationships were within the small effect size range. Students in 6th grade were at decreased risk of having ever tried self-injury when compared to students in 8th grade (odds ratio = 0.80, $P < 0.01$). Abnormal eating behaviors had the strongest effect on having ever tried self-injury, with an odds ratio (OR) of 3.76. Suicide demonstrated the second strongest relationship with having ever tried self-injury: as suicidal tendencies increased, the odds of having ever tried self-injury increased (OR = 2.82, $P < 0.01$). Youth who knew a friend who had harmed

themselves on purpose were 1.84 times as likely to have harmed themselves on purpose as those who did not know a friend who had self-harmed (OR = 1.84, $P < 0.01$). Youth who had tried inhalants were twice as likely to have had tried self-injury as youth who had not tried inhalants (OR = 2.06, $P < 0.01$). Youth who had a stronger belief in their possibilities were less likely to have ever tried self-injury (OR = 0.64, $P < 0.01$).

Given the strength of the relationship between self-injury and suicide, the multilevel logistic regression analysis was rerun with suicide removed from the model to determine whether suicide masked relationships among other predictors in the model and self-injury. Three additional variables became statistically significant ($P < 0.01$): gender (OR = 1.54, 95% CI = 1.15, 2.08), having been hit or pushed by a girlfriend or boyfriend (OR = 1.95, 95% CI = 1.19, 3.21), and the frequency of having been a victim of bullying (OR = 1.16, 95% CI = 1.08, 1.25). Once suicide was removed from the model, females were one and a half times more likely to have ever self-injured than males ($P < 0.01$). Finally, having been a victim of violence placed youth at increased risk for having ever tried self-injury compared to those who had not experienced violence at the hand of a boyfriend or girlfriend. However, the frequency of having been a victim of bullying did not meet the minimal criterion for a small effect size (i.e., OR = 1.50).

DISCUSSION

This is the first study to examine self-injury empirically in relation to multiple risk behaviors within a community sample of early adolescents with the goal of informing school-based prevention efforts. A substantial percentage of students surveyed (28.4%) had tried self-injury. This rate is higher than those reported in most other studies conducted with adolescents in community settings, with the exception of Lloyd-Richardson et al.'s¹⁷ finding of 46.5% and Lundh, Karim, and Quilisch's³⁸ finding of 65.9%. Laye-Gindhu and Schonert-Reichl⁵ reported 15%, Muehlenkamp and Gutierrez⁴ reported 16%, and Ross and Heath²² reported 14%. There are numerous potential reasons for the discrepancy, including possible sample differences between studies, and cohort differences, but the most plausible would seem to be the more inclusive definition used in this study, which included pinching. Further research should be conducted with items that differentiate the various forms of self-injury (e.g., cutting, burning, and not allowing wounds to heal).

Whereas the relationship between gender and self-injury was statistically significant, the effect size (i.e., Cramer's $V = 0.07$) was small. The difference was not of the same magnitude as that reported in Ross and Heath,²² but was more in line with that of Muehlenkamp and Gutierrez,⁴ suggesting boys are catching up with girls in using

Table 5. Bivariate Relationships with Medium Effect Size or Larger

Variable	Finding	Effect Size
Belief in possibilities	Self-injurers reported lower belief in their possibilities	Cohen's $d = -0.64$
Suicidal ideation	Self-injurers reported higher levels of suicidal ideation	Cramer's $v = .44$
Suicidal plans	Self-injurers reported higher levels of suicidal plans	Cramer's $V = .39$
Suicidal attempts	Self-injurers reported higher levels of suicidal attempts	Cramer's $V = .32$
Cigarettes	Self-injurers reported higher levels of cigarette use	Phi = .25
Alcohol	Self-injurers reported higher levels of alcohol use	Phi = .20
Marijuana	Self-injurers reported higher level of marijuana use	Phi = .14
Inhalants	Self-injurers reported higher levels of inhalant use	Phi = .30
Prescription	Self-injurers reported higher levels of using prescription meds to get high	Phi = .20
Abnormal eating behaviors	Self-injurers reported higher levels of abnormal eating behaviors	Cohen's $d = 0.56$

self-injury as a maladaptive coping behavior. This finding is consistent with Winters³⁹ suggestion that increasing rates of self-injury among males represent either an increase in distress and depression among males and/or the influence of media exposure to self-injury on males' choices of coping behaviors.

Most early adolescents in the present study did not self-injure during the past 30 days or were doing so at a low rate (e.g., two or three different times). However, there was a strong relationship between having ever tried self-injury and continuing on to more frequent self-injury. Among youth who self-reported having ever tried self-injury ($N = 495$), 11% had harmed themselves six or more different times. This represents a substantial group of youth who, by early adolescence, may have already developed a chronic behavioral condition that places them at risk for multiple negative outcomes. The results of this study support the contention that self-injury, once tried, is dropped by most but sticks with some vulnerable youth.

Multivariate analysis suggested several factors to target when trying to prevent or address self-injury, including peer self-injury, students' belief that their future held great possibilities, abnormal eating behaviors and suicidal tendencies (i.e., thoughts, plans, and attempts). With the amount of attention recently given to the impact of Internet exposure on self-injury, it was surprising that the amount of time spent using the computer

or video games for fun did not emerge as significant within the multivariate logistic model.^{18,19} This fact may have been due to the lack of precision of the measure. Further research using a more precise measure of Internet use should be used to explore this relationship. When suicide was excluded from the multivariate model, two additional variables became statistically and practically significant: gender and having ever been hit or pushed by a girlfriend or boyfriend. Compared to youth who had never tried self-injury, youth who had tried self-injury were more likely to be female and to have been hit or pushed by a boy/girlfriend. This finding is consistent with Laye-Gindhu and Schonert-Reichl's⁵ supposition that as with gender differences in other expressions of emotional distress (e.g., depression) there may be gender differences in self-injurious behaviors and underlying motivations. Support for this argument is found in the average developmental trajectories associated with depression, self-esteem and anger, all of which are associated with self-injury.⁴⁰ Depression, low self-esteem and anger peak during early adolescence and the gender gap between males and females is the largest at this time.⁴¹

Results suggested a sizable proportion of youth is already discussing self-injury behavior and is aware of its presence among their peers.⁸ This result was not surprising because youth are spending more time with their peers than ever before; they are connected

arguably around the clock via cell phone, Internet, telephone and face-to-face contact at school and other locations.⁴² Almost half of students surveyed (46.8%) knew friends who had harmed themselves on purpose. This dynamic of peer self-injury places youth at risk for having ever tried self-injury.

Among more recent cohorts, it is assumed that adolescents have been exposed to self-injury via some social venue (e.g., media, school).^{11,43} This assumption was tested in this study and was supported. Knowing friends who had harmed themselves on purpose (i.e., peer self-injury) increased the risk of having ever tried self-injury, possibly by setting the scene for some youth to experiment with self-injury when exposed within their peer networks. More than likely, some adolescents who self-injure ("individual deviants") may be surrounded by "fellow deviants" who share their views of self-injury (i.e., the benefits, motivations) (e.g., Goths),⁴³ which may make it difficult for them to cease the behavior.^{11(p.372)} Being surrounded by their "fellow deviants" confirms the "deviant identity" and makes it hard for some adolescents to stop self-injuring and adopt healthier coping behaviors.^{11(p.372)}

Youth who believed they could choose not to use substances even if they were going through tough times, believed their future held many possibilities, and believed they had better things to do than use substances such as cigarettes or alcohol were much less likely to self-injure. On the other hand,

**Table 6. Multilevel Logistic Regression Analysis of Factors that Predict Having Ever Tried Self-injury**

Predictor	Coefficient	P-value	SE	Odds Ratio	95% CI
Female ^a	0.34	.03	0.16	1.41	1.03,1.94
Black ^b	-0.26	.41	0.31	0.78	0.43,1.42
Hispanic ^b	-0.10	.70	0.25	0.91	0.56,1.47
Other ethnicity ^b	-0.22	.49	0.33	0.80	0.42,1.52
Grade level ^c	-0.23	.01	0.08	0.80	0.68,.094
Suicide	1.04	.00	0.10	2.82	2.32,3.43
Peer self-injury ^d	0.61	.00	0.16	1.84	1.34,2.54
Hit by boy/girlfriend ^d	0.56	.04	0.28	1.76	1.02,3.03
Cyberbullied ^d	0.28	.11	0.18	1.32	0.94,1.87
Bully (victim) frequency	0.10	.01	0.04	1.10	1.02,1.20
Inhalant use ^d	0.72	.00	0.22	2.06	1.35,3.16
Substance use	0.05	.76	0.16	1.05	0.76,1.45
Deviant behavior	-0.24	.04	0.11	0.79	0.63,0.98
Abnormal eating behaviors	1.32	.00	0.40	3.76	1.79,7.91
Sex (ever had) ^d	-0.13	.58	0.23	0.88	0.56,1.39
TV viewing time	0.01	.78	0.05	1.01	0.92,1.12
Video/computer use	0.08	.12	0.05	1.08	0.98,1.19
Grades	-0.07	.20	0.05	0.94	0.85,1.04
Attitudes toward school	-0.01	.91	0.09	0.99	0.83,1.18
Belief in possibilities	-0.44	.00	0.15	0.64 ^e	0.48,0.87
Parent communication	0.18	.17	0.13	1.20	0.93,1.56

^aMale is the reference category.

^bWhite is the reference category.

^cSixth grade is the reference category.

^dNo is the reference category.

^eThe inverse of the odds ratio (1/.64 or 1.56) was used to judge the magnitude (i.e., Cohen's Rule of Thumb).

youth who had relatively low levels of belief in their possibilities were more likely to have tried self-injury.

Results suggested substance use including inhalant use plays a key role, although not necessarily causal, in the initiation of self-injury. Although this study was not able to shed light on this role because of the limitations of the correlational design, the literature suggests substance use, in and of itself, is a form of self-abuse and may set the stage for self-injury to occur through the disinhibition process.^{28,46} Prevention efforts should target all substances; however, the results of this study suggested particular attention should be paid to the prevention of inhalant use (a substance more easily obtained by middle school students), particularly

when seeking to prevent experimentation with self-injury.

One key variable related to self-injury; sexual abuse, was not measured in this study. This represents an important study limitation. Childhood sexual abuse should be considered a third variable that explains many of the risk behaviors at play, including suicidal tendencies, abnormal eating behaviors, substance use, deviance and self-injury.^{23,46} Within clinical settings, sexual abuse has been identified as the single best predictor of self-injury, and a recent study conducted among adults has made the association.⁴⁶ Approximately 21% of adults report having experienced sexual abuse as children.⁴⁷ Self-injury, substance use and abuse, deviance, and suicidal thoughts,

planning and attempts offer these youth, who have been harmed by the adults in their lives, maladaptive ways to cope with the trauma. Self-injury, in particular, offers a unique way to communicate distress; one that seems to operate quite effectively in peer and online settings. It would seem one of the most critical means of preventing self-injury would be through the prevention of child sexual abuse through such public health approaches as Stop It Now! (<http://www.stopitnow.com/>).

The use of existing or secondary data was a limitation of this study. The definition of self-injury used on the YRBS was broad, which limited the ability of this study to focus on specific types of self-injury such as cutting and burning. Also, the reliance



on existing data limited the ability to ensure all key variables were included in the analysis (e.g., motivations, history). Further, even though theories of social contagion informed this study, items specific to these theories were not available.^{48,49} Also, a measure of lifetime frequency of self-injury was not included, which limited the ability to accurately distinguish between youth who have tried self-injury once and those who practice the behavior regularly. This study did, however, include a measure of past month frequency of self-injury, which made it possible to identify those who had practiced the behavior recently.

Finally, this study relied on cross-sectional data. Thus, prevalence estimates represent a one-time snapshot of self-injury in a community sample of adolescents. Given the lack of baseline information available for early adolescents in the general population and the methodological variation across studies conducted within general populations of adolescents, it was impossible to explain differences in prevalence estimates between this study and others or determine whether self-injury has increased among early adolescents. Finally, analyses using these data were not able to inform issues of directionality and causality.

TRANSLATION TO HEALTH EDUCATION PRACTICE

Overall, this study supports the need for primary prevention efforts beginning no later than sixth grade. Prevention efforts should address current adverse experiences in the adolescent's life, including bullying online and on school campuses, and dating violence. For example, although boys were more likely to experience dating violence, girls who had experienced this were more likely to report having ever tried self-injury. Prevention programming that addresses dating violence could also address maladaptive coping behaviors such as self-injury. Also, schools should implement evidence-based bullying prevention programs and ensure that every student is ensured a safe learning environment. Finally, schools and community-based agencies need to partner

together to address cyberbullying. There is a need for further research and development in this area.

Prevention and intervention efforts should offer youth who have had adverse experiences (i.e., vulnerable youth) alternatives to using substances and self-injury for dealing with pain and other emotions that stem from these experiences. Efforts to inspire these youth to continue to believe in their possibilities *despite* what they have faced should be made. Engaging children at risk in community youth development activities or other teen-driven prevention programming (e.g., Teen Theater) are possibilities.

Tertiary prevention, or prevention efforts targeted at those who have already adopted a behavior, should focus on reducing the frequency of the behavior while simultaneously increasing the individual's adaptive coping skills. Results suggested self-injury, for some youth, is part of a problem (risk) behavior syndrome that includes substance and inhalant use, deviance, abnormal eating behaviors and suicidal tendencies.⁵⁰ Youth who demonstrate such a syndrome may be in need of interventions that focus at the lifestyle level rather than at the level of individual problem or risk behaviors. Youth who tried self-injury exhibit multiple problems and reported poorer health, lower grades and a tendency to stay home from school if they felt unsafe. This is a group in need of attention. Interestingly, youth who self-injured in this study differed from those described in Fennig et al.,⁸ who were described as high functioning socially and academically but who exhibited internalizing traits (e.g., anxiety)—not severe emotional disturbance. Focusing on the early identification of vulnerable youth and teaching/modeling adaptive coping skills may be a more effort, time, and cost effective approach than a universal approach.⁴⁸ Yip⁵¹ advocated for a multidimensional intervention with emphasis on the social environment, including supportive parents and peers, teaching youth to handle frustration and anger and regulate emotions in positive ways, and nurturing youth with the goal of developing their self-image and promoting their competence.

Youth are discussing self-injury in and out of school settings. Schools could take advantage of this peer dynamic by utilizing peer approaches in the prevention of self-injury. One possible prevention approach is to reposition self-injury as an unacceptable, pathological behavior—not romantic, desirable, or positive,⁶ a behavior that goes against the goal of adolescence (e.g., self-injury is an imitative behavior),^{9,10,15} and a behavioral choice.⁴⁵ Repositioning self-injury in such a way may discourage social reinforcement for the behavior (e.g., attention, sympathy), which may, in turn, discourage the shift from experimentation to repetition.²⁹ Providing youth with materials that coach them on how to deal with a friend who has self-injured and addressing the role of competition and overestimation in spreading the behavior would be essential in addressing self-injury on school campuses.

Finally, school-based prevention efforts should be reinforced by efforts at home. Interestingly, parent communication reduced the odds of having ever tried self-injury. Remember that the communication items were, "My parents have talked to me about their feelings toward me smoking cigarettes" and "My parents have talked to me about their feelings toward me drinking alcohol." Conceptualizing self-injury as a new risk behavior would mean educating parents about the need for talking to their child about self-injury. Parents should be informed of the current cultural trend, the risks associated with self-injury, and resources available to help youth and families who are dealing with self-injury, associated behaviors, and traumas, if relevant.

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